PROCEEDINGS

OF

THE ROYAL SOCIETY.

1830–1831. No. 4.

March 24.

JOHN W. LUBBOCK, Esq. V. P. and Treasurer, in the Chair.

The following Presents were received, and thanks ordered for them:—

Notices of the Proceedings of the Geological Society. No. 19. 8vo. —*Presented by the Society*.

Historical Researches on the Wars and Sports of the Mongols and Romans; in which Elephants and Wild Beasts were employed or slain: and the remarkable local agreement of History with the remains of such Animals found in Europe and Siberia. With a Map and ten Plates. By John Ranking, Esq. 4to.—*The Author*.

Historical Researches on the Conquest of Peru, Mexico, Bogotà, Natchez, and Talomeco in the thirteenth Century by the Mongols, accompanied with Elephants; and the local agreement of History and Tradition, with the remains of Elephants and Mastodontes found in the New World. With Maps and Portraits. By the same. 8vo.—*The Author*.

The Effects of the principal Arts, Trades, and Professions, and of Civic States, and Habits of Living on Health and Longevity. By C. T. Thackrah, Esq. 8vo.—*The Author*.

Cases of Lithotrity, or Examples of the Stone cured without Incision; followed by a Description of the First Symptoms of the Disease. By Baron Heurteloup. 8vo.—*The Author*.

A Treatise on the Coco-Nut Tree. By J. W. Bennett, Esq. 8vo. —*The Author*.

Mémoires de l'Académie Impériale des Sciences de St. Pétersbourg. Tome XI. 4to.

——————— VIme Série. (Sciences Mathématiques, Physiques et Naturelles) Tome premier; 1re, 2me, et 3me livraison. 4to.

——————— VIme Série. (Sciences Politiques, Histoire, Philologie) Tome premier; 1re, 2me, et 3me livraison. 4to.

Mémoires présentés à l'Académie Impériale des Sciences de St.

Pétersbourg par divers Savans, et lus dans ses Assemblées. Tome premier; 1re, 2me, 3me, et 4me livraison. 4to.—*The Academy.*

Rapport sur un Voyage dans les Environs du Mont Elbrouz, dans le Caucase. Par M. Kupffer. 4to.—*The Academy.*

Astronomische Nachrichten. No. 177–193. 4to.—*Professor Schumacher, Foreign Member, R.S.*

A paper was read, entitled "Description of a Mountain Barometer, the column of which is divisible into two portions for safer and more convenient transport." By Mr. Thomas Charles Robinson. Communicated by Captain Henry Kater, F.R.S.

The object of the contrivance described in this paper is to reduce the length of the barometer, when not in use, to one-half the usual length; and to render the position in which it may be carried indifferent. It consists of a glass tube eighteen inches long, cemented into a steel cistern two inches long, and one inch internal diameter, which is furnished with an internal screw, for receiving a hardened steel screw and hemisphere cemented to the end of a syphon tube. The long leg of this tube has an internal diameter of only the six or eight hundredths of an inch, and it is further contracted at the end to the twenty-fifth of an inch, so that no air can pass when the mercury is descending through it. The shorter leg of the syphon has the same bore as the tube.

When the two parts are screwed together, and the whole inverted, the mercury descends from the cistern, fills the long leg of the syphon, and ascends to a certain height in the shorter leg. Any air that may have existed in that part of the cistern which was not occupied by the mercury, is collected in an intermediate space, external to the column of mercury, and therefore can have no influence on the total height of that column, which is determined solely by the pressure of the external atmosphere. On gently reversing the position of the barometer, the mercury will repass from the syphon into the cistern, where it is confined by a stopper, as in a bottle: and may then be carried about in any position in perfect security.

The reading of a paper, entitled "An Account of further Experiments tried at Chatham, for the purpose of obtaining an artificial Water Cement," by Brevet-Colonel C. W. Pasley, of the Corps of Royal Engineers, F.R.S. and Honorary Member of the Institution of Civil Engineers, was commenced.

The Society then adjourned over Easter to the 14th of April.

April 14.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G.,
President, in the Chair.

Joseph Hodgson, Esq. was elected a Fellow of the Society.

The following Presents were received, and thanks ordered for them:—

Notice of the Proceedings of the Zoological Society. Feb. 22, 1831. 8vo.—*Presented by the Society.*

The Philosophical Magazine and Annals of Philosophy. No. 52. 8vo.—*The Editors.*

The Herschelian, or Companion to the Telescope. Part I. By James Holland. folio.—*The Author.*

National Portrait Gallery. No. 24. 8vo.—*The Proprietors.*

The Christian's Magazine. Part I. 8vo.—*The Editor.*

A Concise View of the Origin, Constitution, and Proceedings of the Irish Society. 8vo.—*Henry Schultes, Esq.*

The Rise, Progress, and present State of Public Opinion in Great Britain, and in other parts of the World. Second Edition. By W. A. Mackinnon, Esq. F.R.S. 8vo.—*The Author.*

Meeting of the Cultivators of Natural Science and Medicine, at Hamburgh, in September 1830. By James F. W. Johnston, M.A. 8vo.—*The Author.*

An Experimental Inquiry into the Laws which regulate the Phenomena of Organic and Animal Life. By George Calvert Holland, M.D. 8vo.—*The Author.*

The Physiology of the Fœtus, Liver, and Spleen. By the same. 8vo.—*The Author.*

Ornithological Biography, or an Account of the Habits of the Birds of the United States of America: accompanied by Descriptions of the Objects represented in the Work, entitled, The Birds of America; and interspersed with Delineations of American Scenery and Manners. By John James Audubon, Esq. F.R.S. 8vo. —*The Author.*

Almanaque Náutico y Efemérides Astronómicas para el Año de 1833, calculadas para el Observatorio Real de Marina de la Ciudad de S. Fernando. 8vo.—*His Majesty the King of Spain.*

Sammlung der vom 8. May 1817 bis 31. December 1827 im k. k. Convikt-gebäude nächst dem Piaristenkollegium auf der Neustadt Prag Nro. C. 856, angesteliten astronomischen, meteorologischen und physischen Beobachtungen von C. Hallaschka, Dr. der Phil. u. s. w. 4to.—*The Author.*

Recherches sur l'Appareil Sternal des Oiseaux, considéré sous le double rapport de l'Ostéologie et de la Myologie; suivies d'un Essai contenant une distribution nouvelle de ces Vertèbres, basée sur la consideration de la Forme du Sternum et de ses Annexes. Par M. le Doct. L'Herminier. 2me Ed. 8vo.—*The Author.*

Colonel Pasley's paper was resumed and concluded.

The present paper is occupied with the detail of the experiments made by the author in the prosecution of the object of his former inquiry, already submitted to the Royal Society, into the best means of obtaining an artificial Water Cement. These experiments were tried on a larger scale than the former, and were applied more especially to the practical purposes of building. He recommends that the cement should not be applied in two coats, the surfaces being less likely to adhere when this is done, than if the whole cement is applied at once. He succeeded in various ways, in forming cements which appeared to be the same, in all their properties, with natural cements: and he has now employed them in buildings on a scale sufficiently extensive, and in situations sufficiently exposed to the weather, to be brought to the test of experience in the course of time. Some experiments were also made by the author, with the view of forming an artificial lithographic stone, by a calcined mixture of chalk and carbonate of magnesia: but their density could not be rendered such as to answer the purpose intended.

On the whole he draws the general conclusion, that in all attempts to imitate the water cements of nature by artificial means, carbonate of lime must be the essential ingredient; next to which in point of importance are silica and alumina. The author succeeded in forming a very good cement by uniting these three ingredients. By the addition of a small proportion either of the protoxide of iron or of the oxides of lead, or of manganese, the qualities of the compound were very much improved; these latter ingredients appearing to produce a more intimate union of all of them, and a more speedy and permanent induration of the mass.

A paper was read, "On the Meteorological Observations made at the Apartments of the Royal Society, during the Years 1827, 1828, and 1829." By J. W. Lubbock, Esq. V.P. and Treasurer of the Royal Society.

The author first inquires into the annual and diurnal variations of the barometer and thermometer, for the determination of which he takes the mean of the observations in each month made at the Apartments of the Royal Society, during the years 1827, 1828, and 1829; and also that deduced from Mr. Bouvard's observations, published in the Memoirs of the French Academy of Sciences. From the table given it would appear that the annual variations are independent of the diurnal variations. A much greater number of observations than we possess at present, made frequently and at stated times each day, are requisite before any very satisfactory conclusion can be deduced as to the influence of the moon on the fluctuations of the barometer. The author, however, has attempted the inquiry, as far as the limited range of the present records will allow, by classifying all the observed heights, corresponding to a particular age of the moon, as defined by her transit taking place within a given half hour of the day; and thence deducing mean results, which are exhibited in tables.

The results afforded by the observations at Somerset House differ widely from those obtained from corresponding observations made at the Paris Observatory. According to the former, the barometer is highest at new and full moons, and lowest at the quadratures, the extent of the fluctuations being 0.08 of an inch: according to the latter, the contrary is the case, and the extent is only 0.05 of an inch.

Lastly, the author endeavours to ascertain how far the barometer is affected by the direction of the wind, and gives in the form of tables the mean results of observations bearing upon this point. The fluctuation, he observes, due to this, is much greater than that due to any other cause. The barometer is lowest, as might be expected, when the wind is in the rainy quarters of S.W. and W.S.W. There are not yet sufficient data for any general conclusions with regard to the influence of electrical phænomena on the weather.

April 21.

Sir ASTLEY COOPER, Bart. V.P., in the Chair.

Sir Martin Archer Shee, Knt., P.R.A., was elected a Fellow of the Society.

The following Presents were received, and thanks ordered for them :—

The Utility of the Knowledge of Nature considered, with reference to the introduction of Instruction in the Physical Sciences into the general Education of Youth. By E. W. Brayley, Jun., Esq. 8vo.—*Presented by the Author*.

On the Occurrence of the Remains of Elephants, and other Quadrupeds, in the Cliffs of Frozen Mud, in Eschscholtz Bay, within Beering's Strait, and in other distant parts of the Shores of the Arctic Seas. By the Rev. W. Buckland, D.D. F.R.S. 4to.—*The Author*.

Bulletin de la Société Française de Statistique Universelle. 2me Livraison. 4to.—*The Society*.

Extrait du Bulletin de la Société Française de Statistique Universelle. Rapport de la Commission à laquelle a été renvoyé l'examen du projet de Souscription proposée par M. J. S. Buckingham pour un Voyage de Circumnavigation et de Découvertes. 4to.—*The Society*.

Journal de l'Académie de l'Industrie Agricole, Manufacturière et Commerciale. No. 1—2. 4to.—*The Academy*.

A paper was read, "On the Errors in the Course of Vessels occasioned by local attraction, with some remarks on the recent loss of His Majesty's ship Thetis." By Peter Barlow, Esq. F.R.S., &c.

The author observes that the errors arising from the deviation of the compass produced by the attraction of ships, were formerly much less considerable than at present, from the comparatively small quantity of iron existing in the vessel. The increase of this disturbing force in a modern ship of war is easily accounted for by the immense proportion of iron now employed in its construction, by the use of iron ballast and iron tanks, of iron knees, iron cables, and above all, of iron capstans, besides various other articles made of the same material, forming altogether a very large and powerful magnetic mass.

The direction and intensity of the deflecting forces thus produced, vary in different latitudes and on different sides of the equator; being greatest in the highest latitudes, where the dip is considerable, and when the ship's course is east or west: and in high southern latitudes, being the reverse of what it is in high northern latitudes. In His Majesty's ship Gloucester, which may be taken as an example, the deviation of the compass in the east and west points was found to be, in the British Channel, 9° 30′: so that after running ten miles, the vessel would be more than a mile and a half to the southward of her reckoning, and so on in proportion as the distances increased. An error of this magnitude, occurring in a narrow channel and in a dark night, were it unknown or disregarded, might lead to the most fatal consequences; and the disaster might perhaps be erroneously ascribed to the prevalence of a powerful current, the existence of which was before unknown.

The Thetis sailed from Rio Janeiro, in December last, with a million of dollars on board, in the finest weather, directing her course to the S.E. The next day, thinking they were clear of land, they tacked, and were sailing at the rate of nine knots, when the first intimation they had of being near land, was the striking of the jib-boom against a high perpendicular cliff, which broke the bowsprit short off, and sent all three masts over the side; thus in a moment bringing utter destruction on this fine vessel and her valuable cargo. The author shows that the deviation of the compass arising from the attraction of the vessel, was exactly of the kind which was likely to occasion this great mistake in the ship's reckoning: for the distance run by the Thetis being about eighty miles, if the local attraction of the vessel had been equal to that of the Gloucester, she would have passed five miles nearer to Cape Frio than her reckoning,—an error quite sufficient to account for the fatal catastrophe. The author hence infers the importance of bestowing more attention than has hitherto been given to the influence of the local attraction of vessels, and to the application of the proper means of correction.

April 28.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G.,

President, in the Chair.

James Henderson. Esq., His Britannic Majesty's Consul at Bogotà, was elected a Fellow of the Society.

The following Presents were received, and thanks ordered for them:—

Mémoires de l'Académie Royale des Sciences de l'Institut de France. Tome X. 4to.—*Presented by the Academy.*

Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin. Aus dem Jahre 1827. Nebst der Geschichte der Akademie in diesem Zeitraum. 4to.—*The Academy.*

The Athenæum Journal of English and Foreign Literature, Science, and the Fine Arts. Nos. 166–182. (Jan. to April, 1831.) 4to.—*The Editor.*

A paper was read, "On the Anatomy and Physiology of the Minute and Capillary Vessels." By Marshall Hall, M.D.

The author, considering the minute blood-vessels as *arteries* or *veins*, as long as their subdivisions or junctions are attended with a change in their dimensions, denominates them *capillaries* when no such change occurs. With the aid of an achromatic microscope of Dollond's, he endeavoured to ascertain what differences existed between the systemic and pulmonary circulations, as far as regards these vessels. Dr. Edwards had observed that the batrachian reptiles are speedily killed by immersion in hot water: and the author found that although by plunging any of the animals of that order into water at 120° of Fahrenheit they are speedily deprived of all power of sensation and of motion, yet the action of the heart continues for a very long time, thus affording an opportunity of leisurely observing the phenomena of the circulation, without the infliction of pain, and without any disturbance from the struggles of the animal.

In the fins and tail of the stickleback, the number of the capillary vessels is small, and their distribution simple: the artery runs along the border of each ray till it reaches the extremity, when it is reflected, and becoming a vein, pursues a retrograde course by the side of the artery. This simplicity in the mode of its distribution corresponds with the simple nature of the function of the part, which is merely an instrument for swimming. In the web of the frog's foot, which is adapted to a greater variety of mechanical purposes, the system of blood-vessels is somewhat more complex; the capillaries are more abundant; the arteries, which are nearly equal in number to the veins, pursue a more direct course; and the veins are larger and more tortuous. No pulsatory movement can be perceived in the blood while moving in the capillaries or veins, as long as the circulation is unimpeded and in the natural state. The author was unable to detect any anastomoses between the minute arteries, although they are frequent among the veins, where they give rise to occasional oscillations in the currents of blood flowing through them: neither could he discover any instance, in the web of the frog, of the immediate termination of an artery in a vein. The velocity of the blood is retarded immediately in its passage from the arteries into the capillaries, because the united capacity of the branches is greater than that of the trunk which divides to form them. In the mesentery of the toad, the distribution of the vessels is simple, like that of the fins and tail of a fish.

But in the pulmonary organs, where the purpose to be answered is that of diffusing the blood over the greatest possible extent of surface, the arteries and the veins correspond to each other in all their ramifications, and their adjacent branches generally pursue courses parallel to each other. Their transition into capillaries is effected with fewer subdivisions than in the case of other arteries. No disposition exists among these arteries to form anastomoses with each other, or with the veins; but the intervening spaces are uniformly occupied by a close network of capillary vessels. The lung of the salamander is simply vesicular; that of the frog is cellular, as well as vesicular, and consequently presents greater difficulty in following with the microscope the course of the vessels as they traverse membranes situated in different planes. In the lungs of the frog, the larger vessels pass chiefly on the external surface; but in the toad they follow the course of the internal margins of the vertical meshes. The author concludes from his observations, that the capillaries, properly so called, have no power to contribute to the motion of the blood, and that the capillary circulation depends altogether upon the action of the heart and arteries. In cases of impeded circulation, he observes, the pulsatory movement of the blood may be seen, not only in the arteries, but also in the capillary vessels, and even in the veins.

At nine o'clock, pursuant to the Notice sent to the Fellows according to the Statutes, a ballot was taken for filling three vacancies in the Council occasioned by the resignation of Viscount Melville, K.T., Sir George Murray, G.C.B., and Sir Robert Peel, Bart. Dr. Goodenough and Sir Robert Inglis were appointed scrutators. After examining the Balloting Lists, they reported that John Frederick Daniell, George Dollond, and Charles Konig, Esqrs., were elected Members of the Council.

A Letter from Sir James South to the Treasurer was read, stating, that the Dome of the Building intended for his large Equatorial was nearly completed, and that he would be happy to show it to the Members of the Society any day of the week, between the hours of one and five.

Printed by Richard Taylor, Red Lion Court, Fleet Street.

PROCEEDINGS

OF

THE ROYAL SOCIETY.

1830–1831. No. 5.

May 5.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G.,
President, in the Chair.

Charles James Beverly, Esq. was elected a Fellow of the Society.

The following Presents were received, and thanks ordered for them :—

Notices of the Proceedings of the Geological Society. No. 20. 8vo. —*Presented by the Society.*
The Philosophical Magazine. No. 53. 8vo.—*The Editors.*
The National Portrait Gallery. No. 25. 8vo.—*The Proprietors.*
Researches principally relative to the morbid and curative Effects of Loss of Blood. By Marshall Hall, M.D. 8vo.—*The Author.*
Proposal of a Plan for the investigation of the due administration of Blood-Letting. By the same. 8vo.—*The Author.*
On Astronomy, the Magnet, Tides, &c., with engraved Illustrations. By Thomas Hedgcock, R.N. 8vo.—*The Author.*

A paper was read, " On the effect of Water, raised to Temperatures moderately higher than that of the Atmosphere, upon Batrachian Reptiles." By Marshall Hall, M.D., &c.

Dr. Edwards had found, by a series of experiments, that the batrachian reptiles, when immersed in hot water, live for a shorter time in proportion as the temperature of the water is higher; and that at 108° of Fahrenheit they die almost instantaneously. The author of the present paper observes, that the extinction of life in these cases is owing to a cause of a more immediately destructive agency than the mere suspension of respiration : he finds that if only the head of the animal is placed under water of 120°, the animal struggles, but soon ceases to move; but if the spine as well as the limbs be immersed, convulsions supervene, and the muscles become rigid : in both cases the action of the heart continues. If one of the limbs, which after the extinction of sensibility still remains flexible, be separated from the body, and placed in water of 120°, its muscles contract and become rigid; this effect taking place first in the superficial, and next in the deep seated muscles. When the nerve, separated from the other parts, was alone placed in hot water, the muscles were not affected: and when the muscles had been made to contract by hot water, they were no longer capable of being affected by irritations applied to the nerve. The heart removed from the body, and placed in hot water, gradually contracted and remained rigid. Hence the author concludes that the death of the animal, when occasioned by the sudden application of heat to the surface, is not owing to asphyxia, but to a positive agency, destroying the functions of the nervous and muscular systems; the muscles of involuntary motion being affected in like manner with those of voluntary motion.

A paper was read, entitled an " Account of a new mode of propelling Vessels." By Mr. Wm. Hale. Communicated by Richard Penn, Esq. F.R.S.

The author ascribes the want of success which has hitherto attended all attempts to propel vessels by a discharge of water from the stern, to the injudicious plan of the apparatus employed, and not to any defect in the principle itself: for he considers that the reaction upon the vessel from which a volume of water is thrown, depends in no degree on the resistance it meets with from the medium into which it is ejected, but simply upon the momentum given to the mass. The author proposes to accomplish the object of propelling water by means of an instrument having the form of an eccentric curve, resembling the spiral of Archimedes, made to revolve on an axis. The resistance offered to the water in which it is immersed results from the different distances of the two ends of the spiral propeller from the axis. This propeller acts in a box having also a somewhat spiral form, and the space between the two ends of the spiral, after describing one turn, is open to allow of the exit of the water driven out by the propeller. The bottom of the box has a circular aperture, of which the radius is equal to the distance of the shorter end of the propeller from the axis. The water within this circle meets with no resistance until it arrives at the line joining the two extremities of the propeller, when it is immediately acted upon by the eccentric curved surface of the propeller.

A paper was read, entitled, " Additional thoughts on the use of the Ganglions in furnishing Electricity for the production of Animal Secretions." By Sir Everard Home, Bart., F.R.S.

The author considering animal heat as depending on the ganglions, infers from the analogy of the structure of the abdominal ganglia with the electrical organs of fishes, that animal heat arises from the electricity supplied by these ganglions.

May 12.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G., President, in the Chair.

Captain George William Manby was elected a Fellow of the Society.

The following Presents were received, and thanks ordered for them :—

Royal Astronomical Society. Notices of Proceedings. Vol. 2. Nos. 2 and 3. 8vo.

———————— Charter and Bye-Laws, 1831. 12mo. —*Presented by the Society.*

The Edinburgh Journal of Science. No. 8. New Series. (April 1831.) 8vo.—*David Brewster, LL.D. F.R.S.*

Memoir of the Life and Scientific Labours of the Rev. William Gregor, M.A. By John Ayrton Paris, M.D. F.R.S. 8vo.—*J. G. Children, Esq. Sec. R.S.*

Description of the Skeleton of the Fossil Deer of Ireland, *Cervus Megaceros.* By John Hart, Esq. Second Edition, with an Appendix. 8vo.—*The Author.*

A Key to Bonnycastle's Trigonometry, Plane and Spherical; containing Solutions to all the Problems, with references. 8vo. By Griffith Davies, Esq.—*The Author.*

Recueil de Planches de Pétrifications Remarquables. Par Léopold de Buch. Premier Cahier. folio.—*The Author.*

A paper was read, "On a peculiar class of Acoustical Figures; and on certain forms assumed by groups of particles upon vibrating elastic surfaces." By Michael Faraday, Esq., F.R.S., M.R.I., Corresponding Member of the Royal Academy of Sciences of Paris, &c.

When elastic plates on which sand has been strewed are thrown into sonorous vibrations, the grains of sand arrange themselves in lines which indicate the quiescent parts of the plate, and have been called the nodal lines. This fact was discovered by Chladni, who also observed that the minute shavings cut by the edge of a glass plate from the hairs of the violin bow employed to produce the vibration, collected together on those parts of the plate that were most violently agitated, that is, at the middle of the lines of oscillation, or portions into which the plate is divided by the nodal lines. The same phenomenon is exhibited by lycopodium, or any other very light and finely divided powder. This subject was investigated by M. Savart, who, in a paper read to the Royal Academy of Sciences at Paris in the year 1817, endeavoured to account for this latter class of phenomena by deducing from the primary divisions of the parts of vibrating bodies, certain secondary modes of division, comprising parts that remain horizontal during every stage of the vibration, and which therefore may admit of the settlement there of light powders, while heavier powders can be stationary only at the points of absolute rest.

This explanation not appearing to the author to be satisfactory, he made a great number of experiments, which are detailed at length in the present paper, showing that the immediate cause of these motions exists in the surrounding medium, and is to be found in the currents arising from the mechanical action of the plate, while vibrating upon that portion of the medium which is in contact with the plate. These currents are directed from the quiescent lines towards those parts where the oscillation is the greatest, and meeting from opposite sides at these central points, thence proceed perpendicularly from the vibrating surface to a certain distance; and finally, receding from each other, return again in a direction towards the nodal lines. The combination of these motions constitutes vortices carrying with them any light particles which may lie in the way of the currents. While in motion, the powders sustained by these vortices appear in the form of clouds, the particles of which have among themselves an intestine motion of revolution, rising in the centre of the heap, and rolling down again on the outer sides. The powders are collected in the same situations on the vibrating plate, although the plate may be considerably inclined to the horizon, and remain there even when the inclination is so great as to prevent grains of sand from resting on the nodal lines. A piece of gold leaf laid upon the plate was raised up in the form of a blister at that part which corresponded with the centre of the clouds, even to the height of one-twelfth of an inch.

On attaching small pieces of card to different parts of the surface of the vibrating plate, the currents of air are modified in various ways, as shown by the different positions of the clouds, and the production of partial accumulations of the powders. When a tuning-fork is made to vibrate, and a little powder of lycopodium is sprinkled over it, the powder collects into clouds on the middle of the upper surface, and also forms heaps along its sides, exhibiting in a striking manner the intestine revolution of their particles. These effects are also well illustrated by vibrating membranes; for which purpose a piece of parchment was stretched, and tied while moist over the mouth of a funnel, and made to vibrate by means of a horse-hair, having a knot at the end, passed through a hole in the centre of the parchment; the hair being drawn between the finger and thumb, to which a little powdered rosin was previously applied. The phenomena were still more conspicuous when the parchment was made to vibrate under a glass plate held near it. When the interval between the membrane and the glass plate was very small, the whole of the powder was sometimes blown out at the edge, in consequence of the vibrating membrane acting as a bellows.

Reasoning from the theory which the author had framed in explanation of these phenomena, he conceived that if the currents were weakened by placing the apparatus in rarefied air, they would no longer be capable of sustaining the light powders, which would then be collected, like the heavy powders in air, at the nodal lines. In a denser medium, such as water, the reverse should happen; the heavy powders should be carried along by the more powerful currents then produced, and would accumulate in the vibrating parts. All these conclusions were found to be fully verified by actual experiment.

May 19.

JOHN W. LUBBOCK, Esq. M.A., V. P. & Treasurer, in the Chair.

The following Presents were received, and thanks ordered for them:—

The Astronomical Remembrancer. Proposed by Captain W. H. Smyth, R.N., F.R.S.: exhibiting the Magnitude, Declination, Right Ascension, and Passage in mean time over the Meridian, of one Hundred of the Principal Fixed Stars.—*Presented by G. Dollond, Esq., F.R.S.*
A Narrative of a Visit to the Court of Sinde; a Sketch of the History of Cutch, from its first connection with the British Government in India till the conclusion of the Treaty of 1819; and some Remarks on the Medical Topography of Bhooj. By James Burnes, Esq. 8vo.—*The Author; through Joseph Hume, Esq. F.R.S.*
Catalogue of the Library of the Royal College of Surgeons in London. 8vo.—*The College.*
Catalogue of the Contents of the Museum of the Royal College of Surgeons in London. Part III.: comprehending the Human and Comparative Osteology. 4to.—*The College.*
A Cast from the Marble Bust of Michael Faraday, Esq. F.R.S. executed by E. H. Bailey, R.A.—*Richard Hollier, Esq.*
A Portrait of Michael Faraday, Esq. F.R.S. engraved by Cousins from the Painting by Pickersgill.—*Messrs. Colnaghi and Son.*

A paper was read, entitled, "A Table facilitating the Computations relative to Suspension Bridges." By Davies Gilbert, Esq. V.P.R.S.

The table here communicated is supplementary to those accompanying the paper "On the Mathematical Theory of Suspension Bridges," which was published in the Philosophical Transactions for 1826, and is deduced from the first of the tables there given; but admits of a far more ready application than the former to all cases of practical investigation. It consists of five columns, exhibiting respectively the deflections or versed sines of the curve; the lengths of the chains; the tension at the middle points, or apices of the curve; the tensions at the extremities; and the angles made by the chains with the horizon at the extremities.

A paper was read, entitled, "Researches in Physical Astronomy." By J. W. Lubbock, Esq. V.P. and Treasurer of the Royal Society.

The first part of this paper relates to the theory of the moon. The method of solution pursued by Clairaut consisted in the integration of differential equations, in which the true longitude of the moon is the independent variable: the time is then obtained in terms of the true longitude; and by the reversion of series, the longitude afterwards obtained in terms of the time. This method is the one adopted by Mayer, Laplace, and Damoiseau. The author has been led, by reflecting on the difficulties of this problem, to believe that the integration of the differential equations in which the time is the independent variable would be at least as easy as the former process; and it would possess the advantage of employing the same system of equations for the moon as for the planets. The lunar theory proposed by the author, and developed in this paper, is an extension of the equations given in his former Researches in Physical Astronomy, already published in the Philosophical Transactions; by including those terms, which, in consequence of the great eccentricity of the moon's orbit, are sensible; and by suppressing those which are insensible from the great distance of the sun, the disturbing body. He has not yet attempted to obtain numerical results, but proposes at some future time to engage in their computation.

In the second part of the paper, he investigates the precession of the equinoxes, on the supposition that the earth revolves in a resisting medium; an investigation which may also be considered as a sequel to the author's last paper on Physical Astronomy. The effects of the resistance of such a medium is to increase the latitude of the axis of rotation (reckoned from the equator of the figure) till it reaches 90°. Such is now the condition of the axis of the earth: but as the chances are infinitely great against this having been its original position, may not its attainment of this position be ascribed to the resistance of a medium of small density acting for a great length of time,—a supposition which may account for many geological indications of changes having taken place in the climates of the earth? The operation of such a cause would be also sensible in the case of comets: and the accuracy with which the eccentricity of the Halleian comet of 1759 is known, would appear to afford a favourable opportunity of verifying this hypothesis.

A paper was read, entitled, "An Account of the Construction and Verification of the Imperial Standard Yard for the Royal Society." By Captain Henry Kater, F.R.S.

The scale of the standard, of which an account is given in this paper, is constructed in a manner described in the Philosophical Transactions for 1830. The support is of brass 40 inches long, 17.5 inches wide, and 0.6 of an inch in thickness. A brass plate seven-hundredths of an inch thick was made to slide freely upon the support in a dove-tail groove formed by two side plates, and was then fixed to the support by a screw passing through its middle.

This plate carries the divisions, which are fine dots upon gold discs let into the brass; the scale is divided into inches, and there is one inch to the left of zero, which is subdivided into tenths. The scale is the work of Mr. Dollond. The paper is concluded by an account of the precautions which were taken to ensure the accuracy of the plane surface on which the bar rested, while the comparisons were made with the microscopic apparatus described in the Philosophical Transactions for 1821. The results are given in a table.

A paper was read, entitled, "An Experimental Examination of the Blood found in the Vena Portæ." By James Thackeray, M.D. Communicated by Sir Astley Cooper, Bart. V.P.R.S.

The author, in the course of an inquiry into the properties of the blood, was led to notice some peculiarities in the contents of the vena portæ, and to investigate this subject more minutely. The results of the experiments which he made for this purpose are chiefly the following. The blood contained in the vena portæ is darker than that of the other veins, inclining more to a ruddy hue than to the Modena red. Being less homogeneous, it has the appearance of being less perfectly elaborated. Its specific gravity was found to be very variable, but it is in general less than ordinary venous blood. It coagulates much more quickly, and contains a larger proportion of serum, but a much smaller proportion of albumen, than blood taken from other veins. The serum obtained from it is redder than common serum, in consequence of its retaining much of the colouring matter of the blood: it has also a greater specific gravity, and yields, on exsiccation, a greater weight of solid matter. On the application of heat, it concretes more quickly, but much less completely, than blood from the jugular vein; which peculiarities are attributed by the author to the different state and imperfect formation of the albumen contained in it. The crassamentum of the blood from the vena portæ does not expel its serum so fully as blood from other vessels; but it remains a soft mass, unless artificial means be employed, and it yields a considerably smaller quantity of fibrin.

The Ballot for William Snow Harris, Esq., which should have been taken at this Meeting, was postponed to the next Meeting, in consequence of there not being twenty-one Members present.

The Society then adjourned over Whitsuntide to the 2nd of June.

June 2.

Sir ASTLEY COOPER, Bart. V.P., in the Chair.

William Snow Harris, Esq., and William Wilkins, Esq. R.A., were elected Fellows of the Society.

The following Presents were received, and thanks ordered for them:—

The Journal of the Royal Institution of Great Britain. No. III. 8vo.—*Presented by the Institution.*

The Edinburgh New Philosophical Journal, exhibiting a View of the progressive Discoveries and Improvements in the Sciences and the Arts. Conducted by Professor Jameson. Nos. 19 and 20. (Oct. 1830—March 1831.) 8vo.—*Professor Jameson, F.R.S.*

The Philosophical Magazine and Annals of Philosophy. No. 54. 8vo.—*The Editors.*

The Englishman's Magazine. No. I. 8vo.—*The Publishers.*

National Portrait Gallery. Part 26.—*The Proprietors.*

Library of the Fine Arts, or Monthly Repertory of Painting, Sculpture, Architecture and Engraving. Nos. 1—4. 8vo.—*The Publisher.*

Two Views of the Clifton Suspension Bridge; proposed to be erected according to the design, and under the Directions of I. Brunel, Jun. Civil Engineer, F.R.S.—*I. K. Brunel, Esq. F.R.S.*

A Portrait of the late Dr. Thomas Young, F.R.S., engraved by Turner from the Painting by Sir T. Lawrence.—*Mrs. Young.*

Criteria for determining in which Version of the Holy Scriptures the original Hebrew Computation of Time is contained; with the æras of corruption. By J. Cullimore, M.R.S.L. 8vo.—*The Author.*

A Letter to the Editor of the Edinburgh Review, in Answer to his Criticism on "A Journal down the river Marañon," &c.—By H. I. Maw, Lieut. R.N. 8vo.—*The Author.*

Die Farben. Entdeckungen aus dem Gebiete physikalischer Farbenlehre durch Versuche dargethan. Von Dr. Jacob Roux. Drittes Heft. 8vo.—*The late Author.*

A paper was read, "On the Caves and Fissures in the western district of the Mendip Hills." By the Rev. David Williams, A.M. F.G.S., Rector of the parishes of Bleadon and Kingston-Seamoor, in the County of Somerset. Communicated by Davies Gilbert, Esq. V.P.R.S.

[The Abstract will be given in No. 5. Supplement.]